



1,056,910.

Patented Mar. 25, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

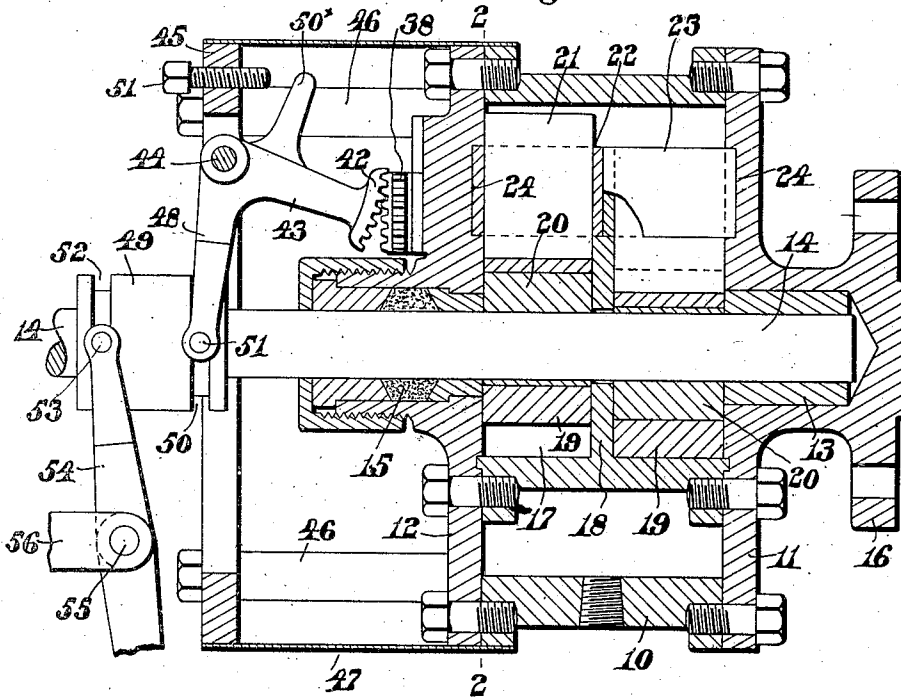


Fig. 6.

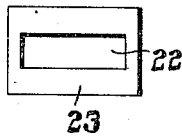


Fig. 8.

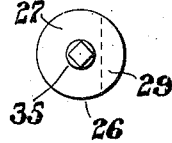


Fig. 7.

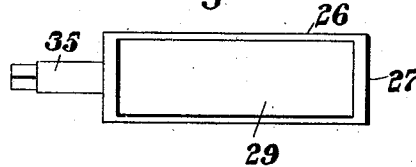
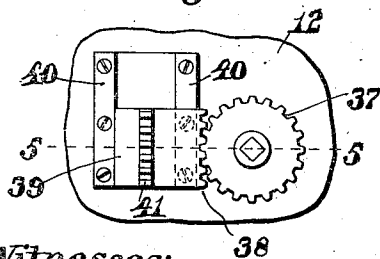


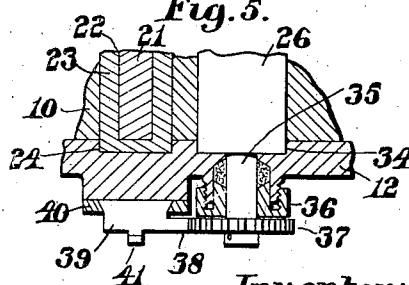
Fig. 4.



Witnesses:

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Fig. 5.



Inventor:

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# UNITED STATES PATENT OFFICE.

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## FLUID-CLUTCH.

1,056,910.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed June 5, 1912. Serial No. 701,917.

*To all whom it may concern:*

Be it known that I, JUSTUS R. KINNEY, a citizen of the United States of America, and a resident of Dorchester, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Fluid-Clutches, of which the following is a specification.

This invention relates to fluid clutches and particularly to a device of this class whereby a rotary movement of the driving member may be imparted to a driven member at varying speeds through the medium of a confined body of fluid.

The invention further consists in means for controlling the flow of said fluid for the purpose of varying the speed of the driven member during the rotary movement of the driving member or to permit the free circulation of the fluid in the casing in which it is confined so that no power is transmitted from one member to the other.

The invention further consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents an end view of a transmission device embodying the features of the present invention. Fig. 2 represents a similar view of the device with one end plate removed therefrom and a portion broken in section. Fig. 3 represents a longitudinal central section of the same, the cutting plane being on line 3—3 on Fig. 2. Fig. 4 represents an end elevation of the mechanism for oscillating the controlling valve. Fig. 5 represents a section thereof, the cutting plane being on line 5—5 on Fig. 4. Fig. 6 represents a plan of one of the slotted oscillating members, and Figs. 7 and 8 represent respectively an elevation and end view of the oscillating or controlling valve.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents a casing member having secured to its ends the cover plates 11 and 12. The plate 11 is provided with a suitable bearing 13 for the end of a revoluble shaft 14 which shaft extends through a bearing 15 in the end plate 12, as shown in Fig. 3 of the drawings. The end plate 11 is provided with a flange 16

forming one part of a coupling member whereby the said member may be coupled to a similar member to which it is desired to impart rotary movement. The casing member 10 is provided with two central cylindrical chambers 17 separated by a wall 18. Mounted in each of the chambers 17 is an annular piston member 19 surrounding an eccentric 20 formed integral with the shaft 14. Each piston 19 is provided with a radial blade 21 extending through a slot 22 in an oscillating member 23. These oscillating members 23 are positioned end to end in the cylindrical openings 23\* extending through the casing 10 with their outer ends mounted in depressions 24 in the end plates 11 and 12, as clearly indicated in Fig. 3 of the drawings.

The opening 23\* in which are positioned the oscillating members 23 is formed in an abutment extending inwardly from the outer part of the casing to the cylindrical wall of the chamber 17. This cylindrical opening 23\* extends from one end plate 11 to the other 12. In this same abutment is formed another cylindrical opening 25 in which is mounted an oscillating valve 26, the cylindrical end portions 27 of this valve being positioned in depressions 28 formed in the end plates 11 and 12. Between the end portions 27 the valve 26 is cut away as indicated at 29, leaving one flat side, and thereby forming a passage for the fluid through the cylindrical opening 25 in which said valve is mounted. The cylindrical opening 25 communicates through a passage 30 with each of the central piston chambers 17 and in a similar manner it is connected through a connecting passage 31 with a chamber 32 partially surrounding the central piston chambers 17 and extending from one face of the inwardly extending abutment to its opposite face. The opposite end of this connecting passage 32 communicates through openings 33 with the piston chambers 17.

The ends 27 of the valve 26 are positioned in depressions 34 in the end plates 11 and 12 as indicated in Fig. 5 of the drawings. This valve 26 has a stem 35 extending through a stuffing box 36 on the end plate 12 and secured to its outer end is a pinion 37 with the teeth of which mesh the teeth of a rack 38 formed upon a slide 39 adapted to be moved toward and from the shaft 14 between guide members 40 secured to the

outer face of the end plate 12. This slide 39 also has formed thereon a rack 41, the teeth of which mesh with a gear segment 42 formed upon the end of a bell crank lever 43 pivoted at 44 to ears extending inwardly from a ring 45. This ring 45 is secured to the end plate 12 by means of the studs 46 and the space between said ring 45 and the end plate 12 is surrounded by the cylindrical member 47. The bell crank lever 43 is provided with a forked arm 48 which straddles a slidable collar 49 surrounding the shaft 14. This collar has an annular groove 50 therein into which extends studs 51 from the two ends of the forked arm 48 so that any movement of the collar 49 longitudinally of the shaft 14 will cause an oscillation of the bell crank lever 43 about its pivot 44 and reciprocate the slide 39 thereby moving the valve 26 about its axis. The bell crank lever 43 is provided with a projecting lug 50\* which is adapted to bear against the adjustable stop member 51 to limit the upward movement of the slide 39. The sliding collar 49 is also provided with another annular groove 52 into which project the studs 53 on a forked shifting lever 54 pivoted at 55 to any suitable fixed member 56. The shaft 14 is preferably the driving member and the casing 10, 11, and 12 may be driven thereby, and when coupled to another member by means of the flange 16 this other member may be driven at any desired speed by varying the opening of the valve 26. In the position of the valve 26 shown in Fig. 2 of the drawings, the oil contained in the chambers 17 and connecting passage 32 is free to circulate as the shaft 14 is rotated. As a result of this free circulation no motion will be imparted to the casing 10 by the revolution of said shaft but as soon as the valve 26 has been moved about its axis by the operation of the shifting lever 54 and the other instrumentalities interposed between said valve and shifting lever the passage 31 will be closed or partially closed and the power will then be transmitted from the driving member to the driven member at a speed determined by the position of said valve. For instance, if the valve has been moved so as to wholly close the passage 31 the oil cannot circulate from the chamber 17 through the connecting passage 32, and as a consequence the driven member will be rotated at the same speed as the driving member. If the passage 31 is only partially closed by means of the valve 26 the driven member will be rotated at a diminished speed, the exact degree of which being dependent upon the amount the passage 31 has been cut off.

It is obvious from an inspection of the drawings that the blade 21 will prevent the oil from circulating in the chambers 17 and consequently the oil must, in the rotation of

the shaft 14, flow through the passages 30 and 31 into the connecting passage 32 and back through the opening 33 into said chamber 17, or if this flow of oil is prevented the two parts of the transmission mechanism will be securely locked together and rotated at the same speed.

One advantage of the device is the provision of a cylindrical valve which is adapted to control the passage of the oil between the chambers 17 and the connecting passage 32, as by such a construction the valve may be readily operated while under pressure which would not be true where sliding valves were used.

It is believed that the operation and many advantages of the invention will be fully understood from the foregoing.

Having thus described my invention, I claim:

1. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical depression therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said depression having a diametral slot therein through which said blade extends; and a valve adapted to control the flow of fluid between said chamber and connecting passage.

2. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical depression therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said depression having a diametral slot therein through which said blade extends; and an oscillating valve adapted to control the flow of fluid between said chamber and connecting passage.

3. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical depression therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said depression having a diametral slot therein through which said blade extends; and an oscillating valve adapted to control the flow of fluid between said chamber and connecting passage.

sion having a diametral slot therein through which said blade extends; a valve adapted to control the flow of fluid between said chamber and connecting passage; and means mounted upon one of said members for controlling the operation of said valve.

4. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical depression therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said depression having a diametral slot therein through which said blade extends; an oscillating valve adapted to control the flow of fluid between said chamber and connecting passage; and means mounted upon one of said members for controlling the operation of said valve.

5. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at its ends, and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical depression therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said depression having a diametral slot therein through which said blade extends; and an oscillating valve consisting of a member having a flat side and adapted to control the flow of fluid between said chamber and connecting passage.

6. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a cylindrical central chamber partially surrounded by a connecting passage communicating therewith at one end and both containing fluid, the ends of said connecting passage being separated by an abutment provided with two transverse cylindrical depressions, both communicating with said central chamber and one also communicating with the opposite end of said connecting passage; a slotted oscillating member in the first mentioned depression; a rotary eccentric piston in the central chamber provided with a radial blade extending through the slot in said oscillating member; a member in the other depression adapted to control the flow of fluid between said central chamber and connecting passage; and means for controlling the operation of said fluid controlling member.

7. In a fluid clutch the combination with driving and driven members, of a cylindrical casing on one of said members having two separated cylindrical chambers, centrally disposed, both partially surrounded by a connecting passage communicating therewith at one end and both said chambers and passage containing fluid, the ends of said connecting passage being separated by an abutment provided with two transverse cylindrical depressions both communicating with said central chambers and one also communicating with the opposite end of said connecting passage; two slotted oscillating members positioned end to end in the first mentioned depression; a rotary eccentric piston in each central chamber provided with a radial blade extending through the slot in an oscillating member; a part-cylindrical member in the other depression adapted to control the flow of fluid between said central chamber and connecting passage; and means for controlling the operation of said controlling member.

8. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a central cylindrical chamber partially surrounded by a connecting passage communicating therewith at its ends and containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical opening therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said opening having a diametral slot therein through which said blade extends; a valve adapted to control the flow of fluid between said chamber and connecting passage; a pinion on said valve; a rack meshing therewith; and means on one of said members for operating said rack.

9. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a central cylindrical chamber partially surrounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a cylindrical opening therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said opening having a diametral slot therein through which said blade extends; a valve adapted to control the flow of fluid between said chamber and connecting passage; a pinion on said valve; a rack meshing therewith; and means on the piston bearing member for operating said rack.

10. In a fluid clutch, the combination with driving and driven members, of a cylindrical casing on one of said members having a central cylindrical chamber partially sur-

rounded by a connecting passage communicating therewith at its ends and both containing fluid, the ends of said passage being separated by an abutment provided with a  
5 cylindrical opening therein; an eccentric piston in said chamber secured to the other member and provided with a radial blade; an oscillating member in said opening having a diametral slot therein through which  
10 said blade extends; a valve adapted to control the flow of fluid between said chamber and connecting passage; a pinion on said

valve; a slidable member having two racks thereon one of which meshes with said pinion; a pivoted gear segment meshing with  
15 the other rack; and means for moving said gear segment about its pivot to control the operation of said valve.

Signed by me at 4 Post Office Sq., Boston, Mass., this 29th day of May, 1912.

JUSTUS R. KINNEY.

Witnesses:

WALTER E. LOMBARD,  
NATHAN C. LOMBARD.